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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/585,495	10/30/2006	Yuriv Mikhaylik	57519.00173	4187

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EXAMINER

WILLS, MONIQUE M

ART UNIT	PAPER NUMBER
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1795

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04/26/2010

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/585,495	Applicant(s) MIKHAYLIK, YURIV	
	Examiner Monique M. Wills	Art Unit 1795	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 January 2010.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-5 and 7-36 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-5 and 7-36 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 06 July 2006 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☒ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413) |
| 2) <input type="checkbox"/> Notice of Draftperson's Patent Drawing Review (PTO-948) | Paper No(s)/Mail Date. _____ |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| Paper No(s)/Mail Date _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

DETAILED ACTION

This Office Action is responsive to the Amendment filed January 11, 2010.

The rejection of claims 1-3, 5, 6, 7-12, 14-15, 19-24, 27-33 & 36 being rejected on the ground of nonstatutory obviousness-type double patenting as being unpatentable over claim 1, 3-9, 12-14, 18, 39, 41 & 45 of U.S. Patent No. 7, 354,680, is overcome. The terminal disclaimer filed August 3, 2009 has been received. The rejection of claims 9-12 & 31 under 35 U.S.C. 112, second paragraph is overcome. The rejection of claims 1-14 & 16-36 under 35 U.S.C. 103(a) as being unpatentable over Visco et al. U.S. Pat. 5,822,812 in view of Visco et al. U.S. Pat. 6,432,584 is overcome. The rejection of claim 15 under 35 U.S.C. 103(a) as being unpatentable over Visco et al. U.S. Pat. 5,822,812 in view of Visco et al. U.S. Pat. 6,432,584 and further in view of Lauck U.S. Pat. 3,915,743, is overcome. Claims 1-5 & 7-36 are newly rejected as follows.

Election/Restrictions

Claims Applicant's election with traverse of "organic nitrates" in the reply filed on January 11, 2010, is acknowledged. The traversal is on the ground(s) that the species are part of a Markush group because they possess at least one property in common such as ionic conductivity. This is not found persuasive because the fact that the species contain properties in common does not reduce the burden of search multiple

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species. Electrolytes by definition are ionically conducting, but they are class in a multitude of areas.

The requirement is still deemed proper and is therefore made FINAL.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 1-14 & 16-36 are rejected under 35 U.S.C. 103(a) as being unpatentable over Visco et al. U.S. Pat. 5,822,812 in view of Visco et al. U.S. Pat. 6,432,584 and further in view of Gan et al. U.S. Pat. 6,136,477.

With respect to **claims 1 & 27**, Visco teaches an electrochemical cell comprising:

- (a) a cathode comprising an electroactive sulfur-containing material (col. 7, lines 1-5) ;
- (b) an anode comprising lithium (col. 6, lines 65-68); and (c) a nonaqueous electrolyte (col. 7, lines 1-5), wherein the electrolyte comprises: (i) cyclic ethers of tetrahydrofuran (col. 4, lines 10-20), polyethers, and sulfones; and a N--O additive, including LiNO₃.

See column 11, lines 60-65. The tuning additive LiNO₃ may be added to the electrolyte (See column 13, lines 31-33 & col. 14, lines 61-62). With respect to **claims 2, 3, 5 &**

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28-30, the one or more N--O additives an inorganic nitrate. See column 11, lines 60-68. With respect to **claim 14**, the cyclic ether includes tetrahydrofuran. See column 10, lines 65-68. With respect to **claims 17-18**, Visco teaches a sulfur positive electrode. It would be reasonable to expect the electrode to include elemental sulfur containing at least 75% by weight sulfur. With respect to **claim 19**, the anode is lithium metal. See column 6, lines 65-68. With respect to **claims 20 & 33**, a separator is interposed between the electrodes. See column 7, lines 1-5. With respect to **claims 21 & 36**, the electrochemical materials are in a battery pack (col. 1, lines 20-30). With respect to **claim 22**, the N--O additive is lithium nitrate. See column 11, lines 60-65. With respect to **claims 26 & 35**, the N—O additives was added to the cathode. See column 14, lines 60-68 and col. 13, lines 30-35, wherein the tuning additive is added with a sulfur-based additive. The combination of additives may be included in the anode, cathode or electrolyte. With respect to **claim 16**, the electrolyte solvent includes sulfolane. See column 10, lines 50-55.

Visco does not expressly disclose: organic nitrate additives such as nitromethane (**claims 1, 4 & 6**) the N-O additive in the electrolyte with a concentration of 0.02 to 2.0m (**claims 9-12 & 31**); adding the N—O additive to the separator (**claims 25 & 34**); lithium salts of $\text{LiN}(\text{CF}_3\text{SO}_2)_2$ (**claims 7 & 8, 32**); dioxolane and dimethoxyethane (**claims 13, 23-24**) .

However Visco, 6,453,584 teaches a lithium -sulfur cell (col. 13, lines 35-45) comprising combinations of nitromethane, dimethoxymethane, dioxolane. The

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reference also teaches the conventionality of lithium trifluoromethanesulfonimide ($\text{LiN}(\text{CF}_3\text{SO}_2)_2$). See column 14, lines 40-45.

Gan teaches that it is well known in the art to employ organic nitrates in electrolytes of lithium cells, in order to achieve high charge/discharge capacity, long cycle life and to minimize the first cycle irreversible capacity .. See column 6, line s1-10.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the conventional electrolyte solvent mixtures and lithium trifluoromethanesulfonimide Visco '584 in cell of Visco '812 because the selection of a known material based on its suitability for its intended use supported *aprima facie* obviousness determination in *Sinclair & Carroll Co. v. Interchemical Corp.*, 325 U.S. 327, 65 USPQ 297 (1945) (**claims 4, 6, 7-8, 13 & 23-24, 32**).

With respect to **claims 9-12 & 31**, although clarity exists with respect to the term "m", it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to vary the concentration of the N-O additive in the electrolyte, in order to optimize the effect to overcharge protection voltage. See column 3, lines 15-20.

With respect to **claims 25 & 34**, it would have been obvious to the skilled artisan to add the N--O additive to the separator in order to increase overcharge protection in the cell. It is well known in the art to added overcharge protection additives to all electrochemical constituents. Further, the reference clearly contemplates adding N-O

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materials to the anode, cathode and electrolyte, it would be obvious to further add the material to a separator to further overcharge protection properties.

With respect to the addition of organic nitrate, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ the organic nitrate of Gan, in the cell of Visco '812 in view of Visco 584, in order to achieve high charge/discharge capacity, long cycle life and to minimize the first cycle irreversible capacity.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claim 15 are rejected under 35 U.S.C. 103(a) as being unpatentable over Visco et al. U.S. Pat. 5,822,812 in view of Visco et al. U.S. Pat. 6,432,584 and further in view of Gan et al. U.S. Pat. 6,136,477 and even further in view of Lauck U.S. Pat. 3,915,743.

Visco '812 in view of Visco'584 and further in view of Gan teach a lithium-sulfur cell as described in the rejection recited hereinabove.

The combination of references teach the conventional employment of dimethoxymethane (col. 14, lines 25-40, Visco '584), but is silent to a diethylene glycol dimethyl ether electrolyte.

However, Lauck teaches the equivalence of diethylene glycol dimethyl ether and dimethoxymethane as electrolyte solvents for use in lithium-sulfur cells. See Example 5.

Therefore, it would have been obvious to one of ordinary skill in the art at the time the instant invention was made to employ diethylene glycol dimethyl ether instead of dimethoxymethane, because Lauck teaches the equivalence of the electrolyte solvents in the art and thus, one of ordinary skill in the art would have found it obvious to substitute diethylene glycol dimethyl ether for dimethoxymethane.

Response to Arguments

Applicant's arguments with respect to claims 1-5 & 7-36 have been considered but are moot in view of the new ground(s) of rejection. Applicant asserts that the references Visco '812 in view of Visco'584 are silent to an organic nitrate. This assertion is correct and the references have been reapplied in view of Gan et al. U.S. Pat. 6,136,477. The new rejections are necessitated by amendment.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

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A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the Examiner should be directed to Monique Wills whose telephone number is (571) 272-1309. The Examiner can normally be reached on Monday-Friday from 8:30am to 5:00 pm.

If attempts to reach Examiner by telephone are unsuccessful, the Examiner's supervisor, Jennifer Michener, may be reached at 571-272-1424. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR.

Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

/Monique M Wills/

Examiner, Art Unit 1795

/Jennifer K. Michener/

Supervisory Patent Examiner, Art Unit 1795